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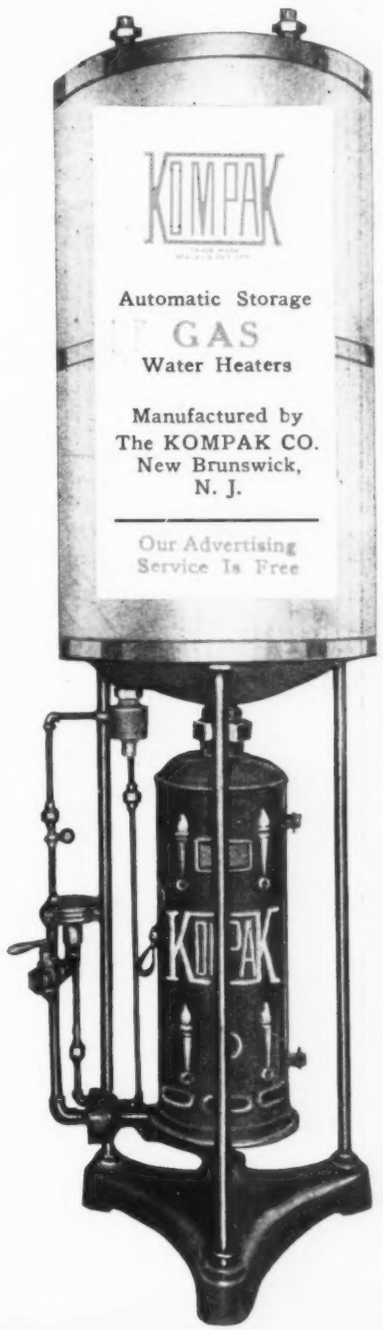

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Earning Possibilities Not Always the Main Lure of an Investor to an Industry

Wealth But the Accumulated Economic Energy of the Period—Giving the Consumer That Ingredient of Coal He Really Has Use for Minus Those Ingredients That Merely Go to Waste

By L. W. ALWYN-SCHMIDT

There has been noticeable in recent years a considerable falling off in the support given by finance to the gas industry. If one looks through the list of shares quoted and dealt in at the leading stock exchanges, one will notice a lack of gas shares, which is quite astonishing considering the general attention which is otherwise given to public utilities by investors.

The cause lies with the gas industry itself and conditions over which it has no control. It has not been able of late to make investments in the industry attractive, and the obvious curtailment of the earnings of the industry resulting from the restrictions imposed upon rates, no doubt, has also to do with the slackness in gas financing.

It is generally held that public utilities are good investments from the point of view of the investor who looks for a safe opportunity to place his surplus earnings and bottle them up for further consumption. But the investor does not look only for the safety of his investment; he likes also to make some additional earning in the form of an increase of the capital value.

The gas industry cannot continue very long in its present state of financial stagnation. It will need capital in the near future to expand, and it will have to find that capital if it is not to go out of business altogether. The gas industry, therefore, must under any circumstances take steps to make investing in gas properties an attractive issue for the man who has the money to invest. The investment must be shown to be safe, and it also must be shown to have opportunities for expansion. Gas financing must enter a new era.

Industry Its Worst Enemy

Our general gas practitioner of the old school will say promptly, "Just give us higher rates and better earning possibilities, and financing will take care of itself." The fact is that higher rates, while they improve, no doubt, the investment situation, are no cure for all evils. The industry is, no doubt, underpaid in many cases and needs a readjustment of its earning possibilities. But experience has shown that earning possibilities are not always the main cause that brings an investor to an industry.

There are industries that have shown enormous earning possibilities but have not enjoyed the confidence of the investor as much as others with less earning capacity but greater stability.

The average investor, in fact, does not want to earn a large amount of money every year, but he wants to see his earnings invested securely against any accidental loss as may occur only too easily in the case of the grand star enterprises that bring a lot of money one year and nothing another.

Also, the investor looks more in the future than does the average industrial producer.

An increase in rates will help the gas industry for a while until expenses have caught up again, and then the trouble will be the same all over. Gas investments will not pay what the investor expects, and the value of the properties will decline.

The investor then has not only to face a decrease in his annual income but, in addition, a shrinkage of his capital value, which he likes least to contemplate.

To bring the investor, large and small, to the gas industry, therefore, will need something more substantial. The gas industry will require a future, and a future sufficiently dazzling and based on well-supported facts that can make it a leading investment issue.

It is a fact that the gas industry holds all those possibilities that should attract the farseeing investor. It is an industry, with quite exceptional possibilities, that will one day take a very prominent place in the economic life of the nation if only the men who are in charge of its future will condescend to see these opportunities and lead the gas industry in a direction where it can make use of it.

Also, with a little foresight and knowledge of investment psychology the gas industry can be made one of

the most safe investment undertakings that can be found.

It is, therefore, up to the present heads of our gas works and those in charge of gas development to look out also for the investment side of their enterprises and manage their affairs in such a manner as to secure to the gas industry the right to ask for additional capital when it will need it to carry out the great plans that must make the basis of its future industrial development.

High Finance and the Investor

Money values have increased considerably during the last years and a safe 4 per cent as the basis for an industrial investment, even in the case of a public utility, does not offer much attraction to the average investor.

Six and seven per cent will be, no doubt, required to bring him in the market for any industrial security.

But there are a great number of investors who will be ready to take up shares under this condition and who will be very much inclined to dispense with the great profits that are found in other enterprises, provided they can see a future for their investment. Further, the industry has to deal with the banks.

The large financier is by no means that intellectual giant frequently painted in our magazine stories, but a man with a good deal of common sense and a great many human limitations which help him along to escape from the danger of getting too rich and being swallowed up by social unrest.

These great men who direct the councils of the banks have realized a long time ago that the possession of money in one hand is by no means adding to the wealth of the nation, but that to create wealth they must help to create the opportunities for making wealth. Living as it is from the movement of wealth in its various directions, they are interested in opportunities for setting it into motion. This is the cause why the electrical and chemical industry has found so readily the assistance of so-called high finance.

Each electrical central station by giving new opportunities to industry has added to the wealth of the world, and in doing so has aided also in the building up of new fortunes. An industry which is stagnant and does not produce new ideas cannot expect the help of the banks, because it leads to a shrinkage of wealth instead of its expansion. After all, wealth is only the accumulated economic energy of the period.

For the banks, therefore, the gas industry provides a rather complicated problem.

As it stands to-day it does not offer any special attractions for investing funds, because while it may be comparatively safe for the investor it really does not aid very much in the development of the future possibilities of the industrial life of the nation. Let the gas industry get out of this rut; let it be shown that it is really an industry with enormous economical possibilities that are only incompletely realized just now, and there will not be any lack of popular and professional support. Money will come forward in any desired quantity.

It seems that these opportunities for the gas industry are sufficiently large enough to justify their speediest development. But the gas industry will have to take up these opportunities, or it may find that some other industry not yet even thought of may take its place and drive the world into another direction, as that indicated at present by the use of gas as a power producer. One might very well wonder, for instance, what would have been the fate of the world if electrical power had been discovered before the invention of the steam engine.

The Future of Gas Financing

What are these opportunities and what do they hold out to the investor?

The war has shown that no country can succeed unless it is willing to make the best possible use of its potentialities. It has shown that raw materials, especially coal, have been used wastefully, and that the utilization of by-products opens new possibilities in the field of national economy that had been imperfectly realized only in the past. It has shown that energy may be preserved as well as materials.

In view of these very apparent truths it seems astonishing that we still persist to-day in continuing many of the wasteful practices of former years, especially that we continue to waste coal in the manner we do. But the public has awakened to the fact that the national resources are handled wastefully by those who control them, and those in control will either have to mend their ways or will have to go. So an improvement in the present utilization of natural resources is bound to come, and when it comes it will benefit the gas industry as the only industry that can offer a practical solution for the present difficulty.

Unlike any other form of production of energy, with the exception of water power, the gas industry is enabled to handle the material economically by utilizing it not only for the purpose of firing but also extracting at the same time the component values in the form of the by-product. This can be done without interfering in any manner whatever with the existing economic organization. It does not affect the business of the electrical industry, nor does it interfere with coal production and distribution. It merely concentrates combustion of coal in such a manner as to conduct it by the most economical means.

The gas industry will undertake to turn the coal into gas and supply it by improved means to the electrical power stations, not operated by water power, to be turned into electrical energy that may be distributed for lighting, heating or power.

It will supply gas to the boiler houses of the industrial enterprises until steam operation becomes impracticable in view of better energy producers.

It will sell gas to the domestic consumer for use in the kitchen, for heating or lighting.

In either case the consumer receives that ingredient of the coal that he really desires to buy when ordering coal, without receiving also the additional encumbrances of smoke, ashes, etc., which he has to accept at the present time as an undesirable by-product of coal utilization. Such a system of coal utilization has the following advantages:

It eliminates the element of competition from the coal markets and may reduce the cost of the coal.

It makes coal distribution easier from the mine to the consumer.

It relieves the city of the necessity of having to remove enormous quantities of coal refuse.

It saves space for storing coal in the factories and homes.

It permits the purchase of energy for any purpose at the time when it is required, eliminating in this manner

(*Continued on page* 91.)

Recognition by Gas Industry that By-Product Oven Is Its Opportunity for Development in Efficiency and Economy Marks Distinct Period in By-Product Progress

S. R. Bellamy Also Considers that There Is General Conviction that Market for Benzol, Ammonia and Tar is Firmly Established

The year 1919 is memorable in the coke industry of the United States, for then production of by-product coke exceeded that of beehive coke. With close to 11,000 by-product coke ovens in present operation, the industry is one of huge dimensions; the modern coking plant is one of the great achievements of chemical and mechanical engineering, declared S. R. Bellamy in a paper before the recent Canadian meeting of the American Institute of Chemical Engineers. The results of a modern plant show what progress has been made. The high yields indicate improved methods; the uniform yields indicate the extent to which operation is under control. A better knowledge of the factors that are essential for good results, coupled with the ability to control these conditions, is the feature of our best plants. The expansion of the by-product coke oven industry has been marked by three distinct periods, which, with the attributed cause, are given in order of sequence:

1. Recognition by the steel industry that by-product coke could be made that was superior to any beehive coke.
2. Recognition by the gas industry of the fact that in the by-product coke oven was its opportunity for development on the lines of real efficiency and economy.
3. General conviction that the market for benzol, ammonia and tar was firmly established and able to absorb all possible production from coke ovens.

The first period was realized by overcoming the old-time prejudice of the blast furnace operator, and then seeking his co-operation in determining what constituted a satisfactory metallurgical coke. To illustrate this, the work of the Semet-Solvay Company in conjunction with that of different blast furnaces is most interesting. For years this company made daily all the tests of which it had knowledge, such as sp. gr., porosity, shatter, loss in CO_2, size of pieces and structure. These tests, accompanied by investigation and research at ovens and furnaces, finally led to the fixing of certain definite standards. By strict adherence to these standards by-product coke has come to sell at a premium. Factors which are considered essential to the production of high-grade furnace coke are:

1. Proper preparation of the coke in all respects, including size.
2. Uniformity of the coal mixture used in the manufacture of coke, thereby producing coke of reliable chemical composition.
3. Uniformity of heating of the charges in the oven, thereby controlling the physical structure of the coke.

Coke Oven Gas

The commercial value of the surplus gas from by-product coke ovens was slow to be appreciated; it was only about eight years ago that any general recognition of this value was apparent. Since then progress in this direction has been so remarkable that to-day the by-product oven looms up as the real solution to the problems confronting our public gas utilities. Very many of the large cities east of the Mississippi River are now supplied with coke oven gas straight or mixed with water gas. The literature of the gas industry as concerns manufacture is now largely devoted to the by-product oven.

In this field again co-operation has meant success. Joint investigation by these two industries has made it possible for the modern by-product plant to deliver a coal gas that will pass the most exacting specifications as to B.t.u., candle-power and purity; and this gas can be produced so economically that no other process can compete. Some of the factors that make the production of such high-grade gas possible are: (1) Proper mixture of proper coals; (2) tight ovens; (3) proper regulation of pressure in ovens and in the hydraulic mains; (4) proper carbonization temperature, and (5) constant and reliable observations.

Market for By-Products

During the world war the by-products from coke ovens were found to be indispensable. Because of their extensive application at that time the merits of these products are now appreciated to the extent that they are just as indispensable in times of peace. As soon as this market was established, the coke and gas industry was quick to avail itself of the fact, and the growth of the industry has been very rapid since then (1914).

The by-products are the same now as before the war, although at that time the Semet-Solvay Company was the only commercial producer of light oils. Improved methods, chiefly in the control of operating conditions, have resulted in much better yields of these products. There is an old coke oven axiom that temperatures incident to the so-called high-speed operation seriously affect the yields. Under modern practice this has been changed so that it can be said that temperatures properly related to the speed of operation do not seriously affect the yields. And likewise the other determining factors are now under regulation.

The Ford By-Product Coke Oven Plant

The modern practices and methods are well exemplified in the plant of the Ford Motor Company at River Rouge, Mich., which is considered by many to be the finest by-product coke oven plant in the world.

This plant was completed and put in operation in

October, 1919. Its chief function is to supply a high-grade metallurgical coke to the Ford blast furnaces. At the same time a contract with the Detroit City Gas Company calls for 10,000,000 cu. ft. of 18 c.p. and 600 B.t.u. gas per day. Thus these ovens constitute a combined coke and gas plant, and must maintain the highest quality in both products. To do this, the speed of operation must not give rise to conflicting factors, but rather all conditions must be properly co-ordinated to the speed of operation. Due to the unsettled conditions in the coal and railroad industries this plant has not had any really fair operation. In fact, very few plants have operated at full capacity during the period under discussion. The operation, however, has been performed at somewhat varying speeds, so that a study can be made of the effects, if any, of such changes.

Equipment and Operation

The Ford plant consists of 120 standard Semet-Solvay regenerator coke ovens built in two batteries of equal size, with each battery independent of the other in regard to control of operation. The gas direct from the ovens is received by a double hydraulic main, one main taking the rich gas given off during the first period of carbonization, while the second main receives the remaining lean gas. This separation of gas during carbonization is performed in the usual manner; i. e., by easily operated valves which can be reversed when and as often as desired. The rich gas and lean gas are treated exactly alike up to the benzol scrubbers. Here the treatment is different, and after passing through these scrubbers the two gases travel different paths, the lean returning to the ovens, the rich gas, after enrichment and purification, going to the city. The apparatus and equipment used to handle the gas is built in triplicate, one unit for the rich gas, one for the lean, with the third and middle unit as a spare. This spare unit is so connected to the system that it can take care of either the rich or lean gas as necessary. The importance of this feature is that repairs, apparatus, cleaning and inspection do not cause inefficient or irregular operation. Having a spare system of by-product recovery apparatus and a spare for all essential machinery used on the ovens, this plant is enabled to operate on a time-table schedule.

Every oven is pushed at the exact time scheduled, the schedule being observed with railroad precision. This regularity of operation, which is essential to the production of a satisfactory quality of surplus gas where high standards are required, means also that the load on the by-product apparatus is uniform and favorable for maximum by-product yields. In the table of results it will be noted that the initial rich gas has been produced without an appreciable variation in B.t.u. value for over three months.

Oven Capacity

Each oven is designed for a charge of 15 tons of pulverized coal and to carbonize this coal in any period from sixteen to thirty hours as desired. The capacity of the oven and the uniform coal charges are points that are worth emphasizing. At the Ford plant not only is the daily average charge per oven uniform, but there is very little variation in the weights of coal charged in the different ovens. The regularity maintained in this operation is shown by Table I, which gives average daily weight of coal charged per shift. This curve is posted in the foreman's office and closely watched by all three shifts.

The size of an oven is determined by the amount of coal that it can carbonize successfully. Size so far has been an index to the progress of the industry, increasing capacity resulting in lower unit costs. This because the plant, exclusive of ovens and force required for operation and maintenance of complete plant, is fixed and independent of oven capacity. That is to say, the power plant, by-product recovery apparatus, piping and other machinery will be practically the same for any given plant regardless of the capacity of its ovens, while the number of workers will be almost the same. The increased tonnage due to large capacity of units will therefore give its yields at little or no cost of production.

Plant Capacity and Yields

Operating on an eighteen-hour schedule, the Ford plant has a daily capacity of 2,400 tons of coal. Were these ovens of 12-ton size the capacity of the plant on a like schedule would be 1,920 tons. In a thirty-day month this would mean that the 15-ton unit plant would carbonize 14,400 more tons of coal than the smaller unit plant. The yields from this increased tonnage would be about 10,000 tons of coke, 345,000 lb. of ammonium sulphate, 45,000 gal. of light oil, 115,000 gal. of tar and 86,000,000 cu. ft. of surplus gas. Figuring that the value of the coke recovered would cancel the cost of the additional coal and cost of producing by-products, there would be a net gain something like this:

345,000 lb. $(NH_4)_2 SO_4$ at 5 cents per pound	$17,250
45,000 gal. light oil at 15 cents per gallon...	6,750
115,000 gal. of tar at 4 cents per gallon.....	4,600
86,000 M. cu. ft. gas at 20 cents per M.....	17,200
Total monthly gain.....	$45,800

It is true that the initial cost of the larger plant would be greater, but the returns just enumerated would yield handsome interest on the additional capital required.

Ammonium Sulphate

Ammonia is recovered by the Semet-Solvay direct ammonium sulphate process, which, representing over eight years' extensive experience with direct methods, marks a notable achievement in chemical engineering. The process is direct in procedure, practically automatic in operation, and produces a pure white salt. The high yields obtained are explained readily by the direct manner in which the gas is treated and by the control of the ammonia reactions.

In the first place, each oven is properly filled with coal, as previously described, so that favorable conditions exist at the start. The coke oven gas upon leaving the ovens travels a short distance from the hydraulic main, and then passes through a two-compartment cooler. From these coolers an exhauster (Curtiss steam turbine) takes the gas and sends it under pressure through a tar extractor of the P. & A. type, then through another two-compartment apparatus called an economizer, from which apparatus it goes to the saturator.

The gas leaves the saturator minus its ammonia, is freed of acid and then cooled for benzol recovery. This is the full journey of the gas so far as ammonia is concerned.

The gas enters the two-compartment cooler at a temperature slightly above 80 deg. Cent. In the first compartment the temperature is lowered about 30 deg. Cent. and in the second compartment it is brought down to 30 deg. Cent. This temperature of 30 deg. Cent. has been found to be the critical one for proper condensation in conjunction with minimum effort for subsequent heating. The cooling medium is a weak ammonia liquor which, traveling over grids countercurrent to the gas, is very efficient. The strength of this liquor is maintained, so that only a minimum amount of NH_3 will be absorbed in the cooling of the gas and the condensation of the light tars. Separation of the tar and liquor is effected in the coolers, which have a large base, by means of decantation. The tar is drawn off from the bottom and runs to a decanter, while the liquor entering the suction pipe of the pump at a higher point is sent through cooling coils and then back to the gas cooler. Each compartment of this cooler has its own circulation. A special constant level overflow device maintains a constant volume of liquor for circulation by carrying away an amount equivalent to that added by condensation and absorption of ammonia.

Ammonia thus held in solution has to be liberated by steam and lime in a still, from which it returns to the gas at inlet to saturator. With this exception, the process is "direct."

The Curtiss steam turbine, whose primary function is that of an exhauster, serves in a threefold manner, for in pumping the gas it is at the same time an efficient tar extractor. Due to heat of compression, the gas leaves the turbine at 50 deg. Cent., or about 20 deg. Cent. higher than it entered. Thus the turbine is exhauster, tar extractor and heater combined. The P. & A. tar extractor removes the last trace of tar.

From the tar extractor the gas goes to the economizer, where it is brought in contact with the liquor of condensation from the hydraulic main to pick up and restore to the gas some of the water of condensation and free ammonia; the gas leaving the economizer is at the proper temperature for the sulphate reaction.

The clean gas at 70 deg. Cent. enters the saturator, which contains sulphuric acid of 45 g.p.l. strength; i. e., nearly normal acid. The saturated acid is lifted by means of an air ejector into a sludge tank in which crystallization takes place, and the unsaturated acid drains back to the saturator. The salt goes to a centrifugal, where it is first dried, and then washed with water. It is dumped from the centrifugals into barrows, weighed and conveyed to a large hopper, from which it is handled into storage by an overhead crane.

A small stream of fresh acids (60 deg. Baume) flowing into the saturator keeps the strength at the proper mark. With acid of the proper strength and gas at the proper temperature, objectionable crystal formation does not take place in the saturator. The small amount of crystals that are bound to form on metal surfaces are not permitted to accumulate. Once each day for a few minutes the acid strength is built up 125 g.p.l., and thus all crystals are dissolved and a clean saturator maintained.

Results

The results obtained at the Ford plant are indicative of the progress that this process makes in ammonia recovery. The high yields, as shown in the tables of operation data, were obtained from a coal mixture containing 20 per cent low volatile coal. From straight high volatile coal even higher yields may be expected.

As important as the yield of a by-product is the cost of production. The unit cost is the test that tells the tale. During the month of April this plant produced over 1,500,000 lb. of ammonium sulphate with an operating force of five men per eight-hour shift and one foreman. This foreman also has charge of the light oil plant.

Clean Gas

One of the most essential points in a direct ammonium sulphate process is clean gas. Practically all the treatment through which the gas passes preparatory for entrance to the saturators is made with the one purpose of obtaining clean gas. Upon the success of this treatment the purity and color of the sulphate depends. Hence the vital question is, "How clean is the gas?" To determine this, the filter paper method devised by the Semet-Solvay Company has been found very valuable. By means of an apparatus called the tar camera a known volume of gas can be drawn through filter paper and a comparison made of the color produced on the filter paper to indicate the degree of purification of the gas. As usually performed, two filter papers are used for each test to absorb the tar from 8 liters of gas.

The amount of tar carried by the gas should be reported by comparing these filter papers with a photographic scale similar to that used in any color comparison quantitative test; or where great accuracy is required the determination is made by weighing the filter papers before and after the picture. This apparatus can also be used for the determination of H_2S in gas. In this test the filter papers used are, of course, moistened with lead acetate.

Table I—Ford Operating Data, 1920

Actual Results of Semet-Solvay Direct Ammonium Sulphate Process

	Jan.	Feb.	Mar.	Apr.	May
Dry coal charged, tons per day	1813	1813	2030	2022	1911
Coal moisture, per cent	5.2	4.4	4.0	3.5	3.5
Sulphate yield, com. lb. per ton	25.7	26.5	25.9	25.8	26.8
Per cent NH_3 in sulphate	25.01	24.94	25.00	24.99	25.00
Acid consumed per lb.	1.07	1.01	0.95	1.00	1.02
$(NH_4)_2SO_4$ % free acid in sulphate	.169	.135	.125	.112	.151
Per cent moisture in sulphate	2.25	2.42	2.46	2.16	1.84

Surplus Gas and Modern Calorimetric Standard

The method employed for the preparation for sale of the surplus gas from the coke oven plant is determined by the specifications which the gas has to meet. The general trend in the industry is toward the elimination of candle-power specifications and the lowering of the calorific value of the gas required for cities. Canada

has now permanently adopted a standard of 450 B.t.u. and no candle-power. Only three of the larger cities of the United States still cling to a high candle-power specification.

This development is in direct line with the conservation of the natural resources of the country, which has its real beginning in the efficient utilization of our basic fuel. It is to the economic advantage of both producer and consumer of gas. It is no longer good economy to enrich gas with benzol to produce candle-power when the requirements for motor fuel are rapidly outstripping the supply. Money spent for enrichment of gas is practically all wasted, as, with very few exceptions, the consumer derives no benefit therefrom. The purchase of special coals, or the separation of the rich gas from the lean, or any other operation involving cost, to increase the calorific value of manufactured gas brings no benefit to the consumer, who must, of course, pay for this increased cost. Public service commissions and gas manufacturers should join in the determination and adoption of the standard of calorific value which permits a million B.t.u. to be delivered to the consumer at the lowest price. Of course, gases containing high percentages of nitrogen, like producer gas, are not considered in this discussion. This argument is illustrated by the following table, which shows the B.t.u. per cubic foot in the various gases when mixed with the theoretical amount of air required for their combustion. This mixture of gas and air is what the consumer actually burns, so it is clear that any of these gases when properly burned with the correct percentage of air will give the same results.

	B.t.u.	Temp. Flame (deg.)
Natural gas	91	1852
Oil gas	93	1915
Retort gas	91.7	1896
Coke oven gas	91	1892
Carbureted water gas	92	1914
Blue water gas	88	1928

So the real point of interest to the consumer is which gas can be furnished to him at the lowest cost per million B.t.u. In several cities, however, the legal standards still require the delivery of gas of high candle-power and high B.t.u. content, and the gas from the Ford plant has to meet the standard of 18 candles and 600 B.t.u.

Light Oil and Gas Enrichment

The recovery of light oil at the Ford plant is so closely related to the enrichment of gas that these two subjects can well be treated together. As is usual in plants where surplus gas of high calorific and candle-power specifications is sold to public utilities, the rich and lean gases follow parallel but separate paths throughout the by-product recovery system. Up to the benzol scrubbers they are treated exactly alike, but from here on the treatment differs.

It is a comparatively simple matter to obtain large yields of surplus gas that will pass the average B.t.u. requirements, which have recently been lowered in most States. In such cases it is possible to remove practically all the light oils from the gas, and if so the rich and lean gases can be treated alike in the recovery of benzol, or the gases may be treated without separation if the calorific standard permits. In being freed of its light oil the surplus gas is lowered in B.t.u. value, but at the same time it has all of its naphthalene removed. This treatment gives a gas suitable for distribution and, if separated, of 590 to 600 B.t.u. value. Such a gas meets the requirements of many cities which retain a high calorific standard, but it will not pass a high candle-power specification; and where such exists it is necessary to produce a very high-grade gas. Proper oven operation will yield such a gas, after which this quality must be maintained and delivered to the city without loss. For distribution it is essential that this gas be free of naphthalene, but it cannot stand the loss of any other illuminant. Of course, all the light oils could be washed out, freed of naphthalene, and then used to enrich the gas to the proper mark. A high-grade gas would result, but the process would be rather inefficient and very expensive. The correct way is to take out the naphthalene without removing the light oils. This is accomplished at the Ford plant by the standard Semet-Solvay apparatus and methods.

Separation of Napthalene Procedure

The lean gas upon leaving the saturator is cooled and enters the benzol scrubber at a temperature of about 25 deg. Cent. In this tall tower it is completely stripped of its light oil content by being washed with an absorption oil of like temperature. This absorption oil, straw oil or ordinary gas oil is circulated countercurrent to the gas flow and leaves the scrubber containing about 2 per cent of light oil.

The rich gas upon leaving the saturator is likewise cooled and enters a benzol scrubber at the desired temperature. Here it is washed by one-half of the benzolized absorption oil from the lean scrubber, the other half of this oil going directly to the light oil still. The small circulation of benzolized oil absorbs all the naphthalene from the gas, also some toluol and xylol, but removes very little benzol. Thus the gas is purified of naphthalene without serious loss of other illuminants. The drop in B.t.u. and candle-power, due to this treatment, is so slight that very little enrichment is neces-

(*Continued on page* 90.)

	January	February	March	April	May
Dry coal charged, tons per day	1,813	1,813	2,030	2,022	1,911
Total gas per ton of coal, M. cu. ft	10.53	10.39	10.63	10.50	10.04
Gas to city per day, M. cu. ft	9,959	10,135	10,004	9,906	10,518
Candle-power initial rich gas	12.83	13.82	14.05	14.27	15.21
Candle-power gas to city, official	18.08	18.17	18.14	18.21	18.12
Light consumed for enriching, gal. per M. cu. ft	0.33	0.14	0.10	0.10	0.05
B.t.u. gas to city	636	647	648	638	643
Light oil produced, gal. per ton	2.32	2.35	2.61	2.43	2.42
True light oil yield, gal. per ton	2.65	3.74	3.76	3.68	3.45
Far yield, gal. per ton	6.02	8.09	8.84	8.64	8.51

Looks to Benzol Only as a Help-Out in Motor Fuel

Elwood Hendrick also Places Small Hope in Oil Shales—Looks to Alcohol as the Real Solution

Sun and rain and brains, that is all we need to check the lowering supply of automobile fuel. Sun and rain a kindly nature provides, we even have the brains, but we are slow in getting them to work. So slow that we throw away each working day in one industry alone, 600,000 gallons of fuel, declares Ellwood Hendrick in an article in *The Nation's Business*.

Alcohol is an answer, not the complete answer, and all we need for alcohol is sun, rain and again, the brains. There are half a dozen other possible sources for fuel, but to each there is a present insurmountable obstacle.

I shall not attempt to prophesy about oil shales. There are oil-bearing rocks of which great deposits are found in Colorado and the Rocky Mountain region and in New Brunswick, and elsewhere in Canada. There are deposits in Scotland, in France, in the Balkans, in South America and in other countries, but so far as the writer is aware no economical, satisfactory retort for distilling shale oil has yet been devised. Without doubt, shale oil will be used. Indeed it has been distilled and used in Scotland for the past seventy years, but on a small scale. There is every reason to believe that the production will be more expensive than petroleum, and how the costs will compare with alcohol is an open question.

It is not within reasonableness that enough benzol and light oils will be produced from coal-tar to supply the requirements for transportation by automobile. Even if we reform our present uncivilized methods of mining coal and wasting it, grading and washing and wasting more, transporting it and wasting more coal and more expense, dumping it and wasting some again, carting to yards and wasting more coal and more value, and then burning it and wasting most of the heat in the process, there will not be enough coal oil to supply our needs for traction. Even if we burn the coal at the mines and pipe the gas or generate the power and transport it by wire and save all the ammonia for fertilizer and the light oils for fuel, we shall not have enough.

As a complete automobile fuel, benzol is disposed to carbonize, although it is useful in mixtures. Over half the coke now produced in this country is made in by-product ovens and the light oils saved. If we make all our coke in this way and drift away from the antiquated candlepower standard for city gas and measure it by the more enlightened method of heat units, and if we change our methods of burning coal to central stations in which the production of gas predominates, there will probably be enough benzene and light oils of tar to improve the efficiency of a considerable part of the fuel used; but that is as much as we can expect.

Acetylene with air makes an explosive mixture, but it is inconvenient owing to the heavy steel cylinders required to carry it. More particularly, however, the amount of power that is required to produce calcium carbide to furnish the acetylene makes us shake our heads. There is a vast amount of unused power in this country; an immense amount of it constantly going to waste; but as soon as it is developed, industry will call for it.

Liquid hydrogen has been proposed for airplanes in war time to meet other conditions than the requirements of economy, but we should need power to obtain it and power again for refrigeration and pressure to liquefy it.

In the light of our present understanding there seem to be but two fuels available to furnish power for automobiles, and these are gasoline—whether obtained from crude oil or from shales—and alcohol. The art of cracking petroleum, as it is called; that is, the art of obtaining gasoline from petroleum from which the gasoline has already been distilled off, is making constant progress, but cracking does not keep up with the increasing demand, so that while we may expect still greater yields from the crude that is pumped, the best that we can expect is that it will help some. I forbear to give figures because it would be the most vapid kind of guessing. I can not see a buyers' market for gasoline unless we curtail our motor-car transportation, and that is a question of economics rather than of chemistry.

Alcohol is now made in vast quantities in this country from the cheapest known material—molasses. This by-product of the sugar industry is brought here in tankers from Cuba and other sugar-producing centers. Great 60,000-gallon stills are employed and the manufacture is under control of chemical technologists of the highest rank. But the industrial requirements of alcohol are far beyond the ordinary belief. They include, to mention but a very few of them, drugs, celluloid, and like substances, soaps, cutting oils, tobacco products, artificial silk, artificial feathers, imitation leather, photographic materials, chloroform, ether, cutlery, cocoa butter, dyes (in great quantities), enamels, lamp filaments, fertilizers, varnishes, paints—and we could cover a page with more of them.

These industries are provided for by domestic manufacture, principally from molasses, and the excess product is mixed with hydrocarbons, such as gasoline and benzene, and sold for fuel in automobiles and flying machines. It is easily sold at a higher price than gasoline on the ground that it is cleaner and goes farther. But it is not a drop in the bucket. Molasses, as we have observed, will furnish some alcohol for motor fuel, but we are looking for quantities far beyond its capacity.

The Question of How Much

Alcohol is now made in appreciable quantities from acetylene. This is interesting in that it is a synthesis of alcohol from the elements that compose it, instead of the more general method of fermenting sugar to alcohol and carbonic acid gas and then distilling off the alcohol. With acetylene we begin with calcium carbide, which requires great power and lime and coke for its production. Calcium carbide and water produce acetylene and there are a number of processes to carry this over to alcohol. But when we consider the amount of power needed to produce the carbide we cannot see any prospect of the quantity required. We can't get 4,000,000,000 gallons into focus.

The waste gas from coke ovens contains from 1

to 4 per cent of ethylene. This may be removed from the gas and changed to alcohol—if the price is high enough to make it worth while. This is just what, in looking for fuel, we do not wish for.

The making of alcohol from sawdust and wood waste is now on a paying basis. The process consists in the treatment of the cellulose in the wood by a mild acid solution under pressure, whereby the cellulose is split down to a readily fermentable sugar and the sugar in solution is fermented to a beer as in other alcohol processes, after which the alcohol is distilled from the beer. It pays and it can help.

Dr. Arthur D. Little, of Boston, who is a leading authority on the subject, declares that the waste wood of the yellow pine industry alone could produce 600,000 gallons of ethyl alcohol (and this is the true grain alcohol) per day. Counting 300 days a year this would give us 1,800,000,000 gallons of spirits. It would also give us 40,000 tons of paper, 3,000 tons of rosin, and 300,000 gallons of turpentine per day together with the fuel necessary for these industries in addition to the lumber we get now. These figures are not idle guesses; they were reached after exhaustive study and experiment.

The figures, however, assume a co-ordinated industry which does not exist and is even forbidden by law to exist. Their principal value is that they point to our industrial shortcomings, rather than to probable results within this generation. Slowly and very gradually good waste is beginning to be brought into industrial use—in spots.

Lumber May Give Out First

The trouble with looking to wood waste to supply us with alcohol is that, at the present rate of development, the complete utilization of wood products instead of selling one-third and wasting the rest, as we do now, may be a long time away. In fact, our supply of timber may be pretty well exhausted before we get around to it. If as an industrial people our ambition were as keen to make bogey as it is to make profits, we could easily count on from 2,000,000,000 to 3,000,000,000 gallons of alcohol from wood waste per year. And if we had this quantity we should probably be replanting trees. But we must figure on great changes in lumbering methods before we can count on an appreciable amount of fuel alcohol from wood waste. An important step in advance would be for lumber manufacturers to convert their sawdust to sugar solutions and evaporate these to a thick molasses, shipping the molasses in tank cars to distillers, rather than distilling at the sawmills. The expenditure of a reasonable sum for research to obtain better yields of sugar is very desirable, and there is reason to believe that this would give favorable results and add a fair margin of profit to the sawmill operations.

The yield of alcohol from the cellulose of wood waste is far short of the theoretical possibility. Wood contains about 90 per cent of cellulose, but there is some doubt as to what this cellulose really is that is, converted into fermentable sugars and then into alcohol. Cotton, for instance, does not respond so readily to this treatment and cotton is, practically pure cellulose. And there is cellulose left over in the refuse of the sawdust after treatment, although a repetition of the process gives very little fermentable sugar. The portion transformed is sometimes called "easily attacked" cellulose. In practice a ton of sawdust is said to yield 21 gallons of 95 per cent alcohol. By an expensive process as much as 40 gallons alcohol has been obtained from one ton of dry wood.

In chemical manufacture the yield's the thing, and, theoretically, the yield of alcohol from wood waste may be greatly increased. That pesky cellulose molecule, however, is a very devil to chemists and until its structure is better known advancement is likely to be slow.

Then, too, it may be possible to grow some lusty annual shrub in warm climates and bring down the cost of alcohol to real competition with gasoline. This is only a possibility now, with good prospects for the next generation. In other words, there is a good source of alcohol on the other side of the fence. We can see it but we can't reach it.

The usual source of supply in the place of sugar or molasses is starch; starch in any way we can get it. Here we need to point out the great cycle of nature to bring the process a little nearer to us so that we may understand how alcohol is our natural fuel along with petroleum, or mineral oil, and why we haven't got it.

Every green leaf of every plant is a chemical laboratory. Through the valve-like openings of its cells there drift from the air two gases: water vapor and carbonic acid gas. Within the leaf there is a product, made in the plant, called chlorophyll which is a catalyst, and the business of a catalyst in chemistry is to cause reactions to take place which would not take place if it were not there. Chemistry is a very human study, and every one of us knows human catalysts.

For this reaction between carbon dioxide and water within the leaf there is needed heat, which comes from the sun, and pressure which is furnished by the walls of the cells. The result is a combination of a number of molecules of water and carbon dioxide into molecules of sugar. But the plant does not need sugar; it needs starch for a reason that we shall soon discover and the sugar molecules or unit particles are then bunched together, or polymerized, again by means of sun heat and pressure; and the result is starch, which has nearly the same proportions of carbon, hydrogen and oxygen as the sugar, but a larger number of the atoms of each in its molecules.

At the proper time the starch is sent along through the twigs and deposited in the seeds. But the plant has other business in hand besides the making of starch for seed. A similar process of bunching the starch molecules goes on and gums are produced and a final step is the making of cellulose by a similar process; for cellulose and most of the gums have nearly the same chemical content and in the same proportions as the sugar and the starch. And cellulose is the structural basis of every cell of every plant or tree.

Now we see that we need not worry as to the raw material for alcohol. The point is to make it. We have cellulose in every stalk and tree, and starch in every seed and nut. In most plants sugar is little more than an intermediate product, and the great

(*Continued on page* 90.)

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As the Journal Views It

Is There an Emergency?

It may be taken as granted that the gas industry supplies a service that the public considers essential to its welfare and comfort; that it supplies a service that the public would not want risk of being without.

Now along comes the gas industry declaring: "A reasonable certainty of adequate rates, a sufficient supply of oil, coal and other necessary supplies, and such manufacturing and operating conditions as will utilize and conserve these materials as well as contribute to all other possible economies of production and distribution" are essential to its continued existence. And it must, it says, have these things quickly.

Is there actually an emergency and are emergency measures imperative?

The gas industry says yes. Asked to substantiate its statement it is prepared to submit complicated data and calculations that make one's head spin to contemplate. It can prove its case, but the public will not give it the opportunity to in this manner prove it. The public has too much else on its mind to thus devote its time.

But the public does place credence in the word of certain men. For this reason the AMERICAN GAS ENGINEERING JOURNAL believes more good is accomplished with the public through a message like the following than all the complicated data we can find the funds to print:

"The emergency is immediate and far-reaching. It embraces the entire industry. The economic conditions—many of them of world-wide extent and influence—affecting the supply of coal, oil, and other essential materials required in the manufacture of

gas, of labor and of the funds needed to maintain and develop our properties, are not bogies invented by the industry to secure preferential treatment, excessive rates, or unwarranted returns upon investment. They are plain facts. All over this land to-day, gas companies, great and small, are rendering, often under most adverse conditions, this service so vital to the welfare and comfort of our people. What they need and should have, in the interest of the public, is the reasonable certainty of adequate rates, a sufficient supply of oil, coal and other necessary supplies, and such manufacturing and operating conditions as will utilize and conserve these materials as well as contribute to all other possible economies of production and distribution."

The words come from George B. Cortelyou.

The public will credit them because it knows Mr. Cortelyou and has confidence in him. It knows Mr. Cortelyou knows what he is talking about and it knows he would not issue such a statement if it was not true.

The Motor Fuel of the Future

Because we do not feel that he is entirely correct in his deductions, we regard it as unfortunate that the article we print elsewhere in this issue by Ellwood Hendrick in regard to motor fuel should have found circulation in a publication so influential among the country's business men as *The Nation's Business.*

In relegating benzol possibilities to the minor role of a helper-out—a mere diluent—in the motor-fuel field, Mr. Hendrick makes the mistake so many others make of basing his calculations on present-day carbonizing capacities as represented principally in existing by-product oven installations.

Now, as a matter of fact, present-day benzol possibilities as a by-product of gas making represent but a mere drop in the bucket in comparison to what might be.

To-day gas is bought for a few domestic tasks and a very few industrial operations. There is no reason, should the price be right, why the total volume for which a market could be found could not be doubled and trebled so many times as to make the head swim.

The benzol produced to-day or that could be produced represents no measure at all of what would be produced were gas being sold for all the uses it should be sold for.

Looks to Benzol Only as a Help-Out in Motor Fuel

(*Continued from page* 88.)

sugar source of alcohol is molasses. The supply, as we have noted, is practically preempted so far as such a quantity as we want is concerned.

In this country we still use corn to make alcohol. The corn is mostly starch and that is treated with a diastase, such as barley malt, whereby it is converted into sugar. Then, in the presence of the yeast plant, sugar in solution enters into the cells of the plant and there it is split up by an enzyme into two substances: ethyl alcohol and carbon dioxide or carbonic acid gas. And that is beer. The alcohol is distilled from the beer. It takes two distillations to produce 95 per cent alcohol.

The Germans grow a special inedible potato for starch for alcohol, a very large potato that is rich in the material needed. We could grow such potatoes, or we could grow sugar beets, for the same purpose as they do in France, provided the price of gasoline is high. Alcohol cannot compete well under present conditions with gasoline, but when it gets scarce or the price gets to or above 50 cents a gallon we can begin to figure on alcohol.

Recognition by Gas Industry that By-Product Oven Is Its Opportunity for Development in Efficiency and Economy Marks Distinct Period in By-Product Progress

(*Continued from page* 86.)

sary. According to the latest figures, only 0.07 gal. of light oil is vaporized per 1,000 cu. ft. of gas to bring the gas above specifications.

Uniformity of Results

The most important feature of this surplus gas operation is the uniformity of results. Not only has the surplus gas yield been high, as will be noted from table of operating data, but it has been a yield of high-grade gas. That is the important fact, for the yield of surplus gas means nothing independently of quality. Furthermore, this yield has been almost constant in amount through the varying speeds of operation. Every day from Jan. 1 to June 1 the gas company has received practically 10,000,000 cu. ft. of gas from these ovens, invariably above the standard and with scarcely any variation in B.t.u. or candle-power values. The uniformity of these results appears remarkable in comparison to those obtained only a few years ago, but show what can be expected from modern ovens with advanced knowledge and methods of regulation. The maximum gas recovery here shown is one reason also for the uniformly high sulphate yield.

The light oil still is of the standard Semet-Solvay type. No fractionation is made, but the light oil is purified, washed and redistilled and sold as motor fuel. A satisfactory motor fuel consisting of benzol, toluol and xylol mixed with an equal amount of gasoline gave the following distillation results:

B. P.	71° C.
Sp. Gr. at 16° C.	0.811

Off at 85 deg. Cent.	10 per cent
Off at 88 deg. Cent.	20 per cent
Off at 91 deg. Cent.	30 per cent
Off at 96 deg. Cent.	40 per cent
Off at 103 deg. Cent.	50 per cent
Off at 114 deg. Cent.	60 per cent
Off at 130 deg. Cent.	70 per cent
Off at 154 deg. Cent.	80 per cent
Off at 195 deg. Cent.	90 per cent
Off at 218 deg. Cent.	95 per cent
Loss on distribution	2 per cent
Residue	3 per cent

During the switchmen's strike there was a gasoline shortage in Detroit, which caused some worry but little or no inconvenience due to the fact that the Ford plant was able to release 300,000 gal. of purified light oil for motor fuel. Tank wagons from the various companies came to the plant for oil, and then distributed it throughout the city. Thus a serious situation was averted.

The light oil that is recovered by the method described comes mainly from the lean gas. The true yield is therefore the sum of the oil produced and the oil left in the rich gas. This total would mean a high commercial yield and one that would be possible wherever the gas specification was below 600 B.t.u. with no candlepower requirements.

Disposition of the Tar

With the enormously increased supplies of tar the market has kept pace, and to-day tar is selling at a decidedly higher price but yet somewhat below its true value. Tar lends itself readily to a variety of uses, many of which are just beginning to be appreciated. The Ford experience affords an interesting illustration in this respect.

The original boiler equipment contained eight 400-hp. Wickes boilers arranged for gas firing. The demand for gas was so heavy that tar was utilized in its place most satisfactorily and at a decided saving over coal, the value of tar being taken at 5 cents per gallon. When using tar the pump at the storage tank is run continuously, so that there is a constant circulation sufficient to meet the highest peaks and yet allow excess tar to be by-passed from the discharge to the suction line. In order to keep the tar hot the discharge line is wrapped with two 2-in. steam lines and the tar reaches the boilers at a temperature of 90 deg. Cent. At that point superheated steam is used to raise the temperature to 100 deg. Cent. and by means of steam injectors delivered to the tar burners.

When the price of fuel oil became almost prohibitory the Ford company began experimenting with tar to take the place of oil in the heat treatment of forgings, etc. This worked out so satisfactorily that they expect shortly to be using 15,000 gal. of tar per day, which will do the same amount of work as the 25,000 gal. of fuel oil formerly used. Part of this is due to the higher efficiency of the tar and the balance to improvements in operation. This tar is as it comes from the by-product coke plant, no further refinements being necessary.

In conclusion, I wish to acknowledge the assistance given by A. A. Kelkenney, superintendent of the Ford coke plant, in preparing the operating data shown here, and to express my appreciation of the courtesies and assistance given me by his organization.

Earning Possibilities Not Always a Lure of an Investor to an Industry

(*Continued from page* 82.)

the necessity of locking up large sums of money in coal reserves.

It saves a lot of human energy which is now expended in either of the many operations required in the handling of coal.

In addition to these great savings, the concentration of coal combustion in the gas works has the added advantage of retaining for the nation all the so-called by-products of coal.

Who will say that an industry that can accomplish all this is not an industry with a sound economic future?

But the industry so far has shown no inclination to make use of these great opportunities. It has operated fairly successfully for a series of years, and has now come to a point where it is urgently in need of a program and, incidentally, of a leader. The investor will be very much inclined to credit all that has been said just now about the possibilities of the gas industry, but he will be entitled to doubt the abilities of the gas industry to execute such a program on the basis of its former showing.

Wanted—An Economic Platform

The gas industry, therefore, should agree by way of its large organizations upon an economic program. This program should include:

1. The concentration of all coal combustion in the hands of large gas plants, financed by private capital but under public control, centrally located.

2. The construction of a pipe-line system bringing gas in the reach of every likely consumer, this pipeline system to be constructed either by the State or nation and the property of the nation, or at least under public control if constructed with private money.

3. The sale of gas to the consumer at an even rate based upon cost of production, with a fair share of interest for the investor and a national reserve fund for further expansion.

4. The erection of by-product plants in connection with the large gas plants, and an organization enabling the collection of minor by-products in the smaller gas plants for the purpose of further conversion in special centrally located by-product factories.

5. The sale of these by-products at agreed rates permitting a fair profit to producer and consumer in the United States.

6. The formation of a bureau of gas research to aid in the development of by-products and to find new uses for the by-products of coal combination. This bureau might be under State control or part of the activities of the Government, on the line of the United States Geological Survey.

This program, when once fully established, should be made the basis of a policy to be carried out systematically by each gas plant in the United States.

Several advantages, no doubt, will accrue from such a step. The first will be to give a new incentive to gas enterprise in the United States by setting a new aim to all those engaged in the production of gas. The public will be interested in the work done by the gas industry. A sound basis will be provided for financing new enterprise in the gas industry.

Pending the accomplishment of the whole scheme, which nevertheless should never be lost sight of, each gas plant should set out to make as much of its own as can be attained inside the distribution field of each plant and the means at hand.

The question should be considered seriously whether it pays financially to connect each house in one terri-

tory at the company's own expense with gas piping, and to install, if necessary, gas stoves free of charge in each home. What would it cost to replace the present coal-firing system in the factories in the distribution field by gas-firing systems, and would the additional consumption of gas attained in this manner permit the construction of an efficient by-product plant? What additional capital would be required for carrying out such a comprehensive scheme, and, if carried out, will the sales be sufficient to pay both for the additional installation and an interest on the investment?

There is no doubt that such a widely drawn policy would bring success. The safety for the investor is provided in the very comprehensiveness of the plan, which guarantees additional sales of gas for every foot of pipe that is added to the system and for every kitchen range and meter that are installed. The earnings from the by-product plants will give added security to the enterprise by bringing in its range a new source of income that has formerly been left unconsidered.

How Costs Vary With B.t.u. Content

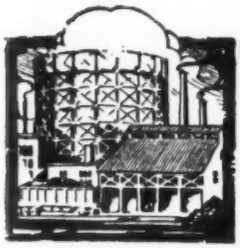
Gas men at the Asbury Park meeting of the New Jersey Gas Association were interested in the following index of cost variation in relation to B.t.u. content as found by the New Jersey Public Service Gas Company:

	607 B.t.u.	600 B.t.u.	575 B.t.u.	550 B.t.u.	525 B.t.u.	500 B.t.u.	475 B.t.u.	450 B.t.u.	425 B.t.u.	400 B.t.u.	375 B.t.u.
Oil	50.78	49.50	45.33	41.29	37.12	33.09	28.92	24.75	20.58	16.54	12.37
Generator fuel	16.35	16.48	16.97	17.44	17.93	18.39	18.86	19.35	19.84	20.30	20.79
Generator house labor	2.22	2.24	2.30	2.37	2.43	2.50	2.56	2.63	2.69	2.76	2.82
Other production expenses	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58	14.58
Total	83.93	82.80	79.18	75.68	72.06	68.56	64.92	61.31	57.69	54.18	50.56
Residual credit	1.83	1.78	1.63	1.49	1.34	1.19	1.04	0.89	0.74	0.60	0.45
Total production (net)	82.10	81.02	77.55	74.19	70.72	67.37	63.88	60.42	56.95	53.58	50.11
Reduction	....	1.08	4.55	7.91	11.38	14.73	18.22	21.68	25.15	28.52	31.99

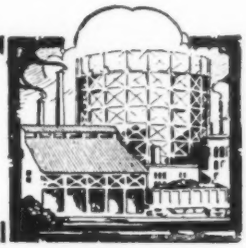
B.t.u. per Cu. Ft.	— Composition — Cu. Ft. Blue Gas per M.	Cu. Ft. Oil Gas per M.	B.t.u. Per Cent from Blue Gas	B.t.u. Per Cent from Oil Gas	Gal. Oil per M. Gas Made	Gen. Cap. Water Gas Sets	Gen. Fuel per M. Gas Made
607	736	264	36.3	63.7	3.775	100.0	33.30
600	742	258	37.1	62.9	3.68	99.2	33.57
575	764	236	39.9	60.1	3.37	96.3	34.57
550	785	215	42.8	57.2	3.07	93.8	35.52
525	807	193	46.1	53.9	2.76	91.2	36.51
500	828	172	49.6	50.4	2.46	88.9	37.46
475	849	151	53.6	46.4	2.15	86.7	38.41
450	871	129	58.0	42.0	1.84	84.5	39.41
425	893	107	63.0	37.0	1.53	82.4	40.40
400	914	86	68.6	31.4	1.23	80.5	41.35
375	936	64	74.9	25.1	0.92	78.6	42.35

B.t.u. per Cu. Ft.	Cost of Gen. Fuel per Net Ton	Cost of Oil per Gal.	Cost per M. Cu. Ft. Gas Made — Generator Fuel	Oil	Generator House Labor	Residual Credit
607*	$9.82	13.45c.	16.35c.	50.78c.	2.22c.	1.83c.
600	9.82	13.45c.	16.48c.	49.50c.	2.24c.	1.78c.
575	8.82	13.45c.	16.97c.	45.33c.	2.30c.	1.63c.
550	9.82	13.45c.	17.44c.	41.29c.	2.37c.	1.49c.
525	9.82	13.45c.	17.93c.	37.12c.	2.43c.	1.34c.
500	9.82	13.45c.	18.39c.	33.09c.	2.50c.	1.19c.
475	9.82	13.45c.	18.86c.	28.92c.	2.56c.	1.04c.
450	9.82	13.45c.	19.35c.	24.75c.	2.63c.	0.89c.
425	9.82	13.45c.	19.84c.	20.58c.	2.69c.	0.74c.
400	9.82	13.45c.	20.30c.	16.54c.	2.76c.	0.60c.
375	9.82	13.45c.	20.79c.	12.37c.	2.82c.	0.45c.

*607 B.t.u. is the requirement for the water gas made by Public Service Gas Company with a 600 B.t.u. standard, the coke oven gas having an average of 587 B.t.u.



NEWS OF THE GAS INDUSTRY



New Jersey Gas Association Prepares for Heat Unit Standard Hearing

450 B.t.u. Gas Recognized as Ideal for Both Company and Consumer—As a Conservative Step Higher Standard Will Be Asked for

Though of the opinion that 450 B.t.u. gas is the ideal standard both for the consumer and the company, the weight of opinion of New Jersey gas men, as expressed at the summer meeting of the gas association of that State in Asbury Park, June 27, seemed to favor a higher standard, radically lower than existing standards, as that to be advocated at the State hearing on the matter which is to be held this week.

Possibly seventy-five gas men were present at the meeting, which was held under ideal weather conditions at Hotel Monterey.

The meeting was opened by F. R. M. Cutcheon, president of the association. Prominent among those present were: W. W. Barnes, H. D. Whitcomb, Charles W. Hay, S. J. Franklin, W. Griffin Gribbel, C. Edwin Bartlett and J. D. Shattuck.

Mr. Whitcomb was the principal spokesman as to the B.t.u. standard that should be set.

Mr. Hay advocated asking at this time for the standard that was considered by all means best—450 B.t.u.

The upshot of the meeting was the appointment of Mr. Whitcomb, Mr. Hay and Mr. Franklin as a committee to decide what standard to ask for and to represent the association at the State hearing.

In the course of the meeting Mr. Gribbel spoke, warning appliance manufacturers that their best interests lay in sinking or swimming with the gas companies in the appliance end.

In the absence of the seaside resort's Mayor W. W. Barnes maneuvered considerably to qualify C. Edwin Bartlett to extend the official welcome. Mr. Bartlett was willing but not sufficiently solid on New Jersey institutions to express wholeheartedly the thought that what he was welcoming them to had any particular advantage. Mr. Bartlett, we understood summers in Cape May and objects to the manner in which his automobile license tax is computed.

Mr. Shattuck emphasized the emergency with which gas companies now are confronted.

Louisville G. & E. Bond Issue

Bonbright & Co., Inc., Byllesby & Co., and the Federal Securities Corporation, are offering $3,500,000 Louisville Gas & Electric Company, of Louisville, Ky., bond secured 8 per cent gold notes, due Jan. 15, 1923.

Net earnings of the company, excluding depreciation for the year ended May 31, 1920, after deducting all prior annual charges, are nearly three and one-half times the annual interest requirements on these notes. Net earnings for the annual charges of the total funded debt, including interest on the present issue. Louisville Gas & Electric Company and affiliated companies own and operate, without competition, the entire gas and electric properties of Louisville, Ky. Notes will be secured by a trust agreement in which the company will agree to pledge with the trustee, on or before Aug. 15, 1920, $5,250,000 general mortgage 6 per cent bonds, due Jan. 15, 1923, as collateral.

Woodhaven Gas Company Gets Stay

Justice George V. Mullen in the Supreme Court has granted a writ of certiorari and a stay in the application of the Woodhaven Gas Light Company, Brooklyn, N. Y., which is fighting an order of Public Service Commissioner Nixon directing the company to extend its mains to outlying territory in the Fourth Ward of Queens. The writ makes it unnecessary for the company to comply with the order until the case is reviewed by a Justice of the Supreme Court.

Appellate Court Annuls Gas Rate Increase Order

The Appellate Division, Third Department, New York State, which reconvened for consultation, handed down a decision annulling a determination of the Public Service Commission, second district, which permitted the People's Gas, Light & Coke Company to increase the rates for gas to consumers in Buffalo, N. Y., from 90 cents to $1.20 and from $1.20 to $1.45 outside of the city of Buffalo.

The city opposed the ruling of the commission granting the increase as excessive and unreasonable. Justice Hasbrouck had granted an order providing for the repayment of the excess charges in the event the increase over the former rates were not upheld by the courts. Justice Cochrane wrote the opinion of the court and the proceeding was remitted to the commission for further action.

Gas Company's New Rates Halted

The Board of Public Utility Commissioners has suspended until Oct. 15 a proposed new rate of $2.50 per 1,000 cu. ft. to be charged by the Pleasantville Gas Company, Pleasantville, N. J. The company also wanted permission to charge 25 cents a month as a service charge.

May Lower Quality of Gas to Prevent Increase in Price

At the hearing before the Utility Board in Newark, N. J., the rate increase asked by the Public Service Gas Company, Mr. McCarter, president of the company, as the first witness, went into a comprehensive summary of the condition of the gas industry, with particular reference to the experiences of the Public Service Gas Company. He began by citing the action of the Public Utility Commission in the Passaic gas case, dating from the summer of 1911 and carrying the history of the company's business through the succeeding steps of 90-cent gas, 97-cent gas and $1.15 gas, which latter rate was fixed by the State board in Nov., 1919. Mr. McCarter detailed at great length the radical changes which have taken place in the cost of the manufacture of gas since the $1.15 rate was fixed.

Henry Whitcomb, general manager, in his testimony, gave the detailed operating figures, and Mr. Barker explained the financial exhibits and the estimates covering the ensuing year's business which was submitted to the utility board and upon which the company's application is based.

As the hearing progressed City Counsel Congleton, of Newark, raised the question as to whether it would not cost less to produce gas if the standard required by the State were reduced from 600 B.t.u. to 525 B.t.u. Mr. Whitcomb replied that it would make a difference in the cost of gas of about 11.81 cents per 1,000 cu. ft. A discussion on this point developed the fact that since 600 B.t.u. was fixed as the standard in New Jersey the tendency elsewhere has been toward a lower heating standard. It was stated that Philadelphia, only lately, agreed to a reduction to a 530 B.t.u. standard; that the State of Massachusetts has had a standard of 528 B.t.u. for a long time; that Baltimore exacts only a 500 B.t.u. standard; that the standard throughout England and Canada is 450 B.t.u.

President Slocum of the Utility Board pointed out that the standard fixed by the State applied to all companies and that if a motion was offered to change the standard it would be given consideration. Secretary A. N. Barber of the commission pointed out that under the statute orders of the board are supposed to be changed only after hearing. Mr. Congleton remarked that he was not authorized to make a formal motion for a reduction of the heat standard but he thought the board would be justified in investigating whether it would be desirable in view of the saving that might accrue to consumers. The question arose whether the standard could not be reduced without materially affecting the efficiency of the gas service. Mr. Whitcomb gave it as his judgment that there would be so little difference in the efficiency of the gas that consumers would not notice it because the gas of lower heating standard would give better combustion and more uniform efficiency. He added, however, that there would be a noticeable difference when such gas was used as an illuminant in open-flame burners, but that scarcely 5 per cent of gas consumers now use this antiquated and uneconomical method of lighting. Mr. Slocum said the board would get all the facts that it could.

In concluding his testimony, President McCarter issued what he termed "a solemn warning but not an ultimatum" regarding the ever increasing difficulties which beset his company because of the mounting prices of everything which enters into gas making.

A high light in his narrative was the declaration that oil companies are unwilling to sell oil for gas making; that they prefer to convert it into gasoline because of the greater profit so obtained. The $1.15 rate was fixed, he said, when gas oil sold for five cents a gallon at Bayonne, making the average price at the company's plants 5.18 cents a gallon.

The five-cent price, Mr. McCarter continued, expires by contract Aug. 1, next. Several months ago, he added, the company sought bids for oil for the coming year, but the best figure it could get was 13 cents a gallon at Bayonne and 13.45 delivered at the gas plants.

Then Mr. McCarter took up coal, which he said presented practically the same critical situation as oil. "In some respects," he continued, "it is worse. We generally know what oil is going to cost, but we never can tell about coal. For six weeks," he said, "we have been paying $10 a ton at the mines for about 50 per cent of the coal we use, whereas the contract price is $3.50."

Twenty-two municipalities sent representatives to a meeting in Newark to organize a fight against the proposed advance in the gas rate.

New Orleans Gas Light Co. Supplies Gas Despite Strike

On June 30th when the contract between the Amalgamated Association of Street & Electric Railway Employees and the New Orleans Railway & Light Company terminated, all of the employees of both the Gas and Railway Departments were called out on strike when negotiations between the company and the association were broken off as it was impossible to grant the increased wages the employees demanded. This walk-out affected about 250 men employed with the gas company as gas makers, helpers, laborers, meter repairers, arc trimmers, and mains and service department employees.

The strike has lasted twenty-three days and, in the interim, they have practically filled all of the places of the gas makers, helpers, etc., used in the production of gas. There has been no interruption of gas service by the walk-out of the employees.

While they have not built up all of the forces of the mains and service and installation departments, they anticipate having a full complement of men sufficient to take care of all operations by the first week in August.

When this walk-out occurred, there were only four men who remained loyal, and, as a consequence, all of the superintendents, foremen and clerks volunteered their services with the result that they were able to supply the city with an uninterrupted service.

THE U. G. I. CONTRACTING COMPANY, of Philadelphia, Pa., has recently awarded a contract by the Springfield (Mass.) Gas Light Company for the installation of one 11 ft. carbureted water gas set. This apparatus will be of the latest cone top type, and will have a daily capacity of 3,500,000 cu. ft.

Bill Creating Special State Commission to Supervise Coal Industry Before Indiana Legislature

House of Representatives Approves of Measure—Gas Utilities Facing Dire Coal Shortage—Passage of Bill Will Mark New Era of Control of the Basic Industry of Gas Production

Suddenly the coal problem, and particularly as it relates to the fuel supply of the gas utilities, and other utilities of Indiana, and other States depending on Indiana coal during the coming winter, has become the dominant factor of the special legislative session, which has just convened at Indianapolis. Rapidly the coal problem has become even larger than a one-state affair, since a bill has been passed by the Indiana House of Representatives, which would have many of the provisions of the Federal Lever law in itself and would—if enacted in the Hoosier State—immediately become battle ground for the entire country, now facing a dire coal shortage in the coming winter.

The proposed measure would create a special State commission to supervise the coal industry and this commission also would have the power to investigate food prices.

Hinging on the coal bill proper, which was before the Indiana Senate for action during the early days of the present week, also has centered a personal and political fight on Governor Goodrich, of the Hoosier State, which has little if anything to do with the main issues, involved in the passage of the coal bill proper. Acting because of the personal issues raised, however, the governor on Monday, July 19, appeared personally before the Senate, and discussed the bill and its effect on Hoosier gas utilities and other utilities frankly.

In part he said: ,

"I urge the enactment of House bill No. 548 because it places in the hands of the Public Service Commission the power to order 100 per cent car service to any mine operating in whole or in part on State account. I urge this for two reasons: First, it would enable us in time of crisis to guarantee to the State institutions an adequate supply of coal. Again, because it will enable the State to purchase its coal upon the same level as the railroads of the State. There can be no possible objection to the State using the power that lies within its grasp for the protection of its own interests. The bill authorizing the State to regulate the price of coal in Indiana is essential at this time for the proper protection of our people. Some question may be raised as to this being the proper exercise for the police power of the State. I admit that the question is not free from doubt, but it is for the general assembly to take such action as may be needed in the public interest and in questions of doubt leave the question of the constitutional power to the judgment of the courts of last resort.

Prices at Unnatural Level

"We have within the borders of our State an abundance of soft coal of most excellent quality. We have the man power ready and willing to mine the coal at a reasonable wage. Not only in this State but throughout the country the mines are producing more tons of coal per month than ever before, except during the war period, and our production at this time is far in excess of last year. Notwithstanding this fact, exorbitant prices are being charged throughout the State and nation—prices that result for the time being in an excessive profit for one of the necessities of life. A hysteria for buying is prevalent everywhere. Consumers are bidding against each other and forcing the price to an unnatural level. The situation affects every home in the State. The coal operators of Indiana under existing conditions are able to charge a profit of more than 100 per cent of the cost of mining, including depreciation, depletion and overhead. This is increasing the burden upon every household in the State and is affecting every public utility. If the State is powerless to protect its citizens against this situation and if it is permitted to continue unrestrained, it will cast such an increased burden upon the utilities as to make necessary the increase of every light, heat and gas rate in Indiana, thus adding to the already heavy burden of living expense.

"Coal is a commodity essential to the preservation of life and industry in our State. Without it we cannot exist. To maintain, as some citizens do, that the coal operators should be permitted to go unrestrained, that the State has no authority to regulate the price they charge for their product because coal mining is a purely private business, is to hold that the State is helpless to protect its own citizens against injustice and extortion.

"Coal is not only an essential commodity, but under present conditions it is a monopolized commodity, and if the operators are permitted to continue unrestrained there is no limit to the prices they can extort, or the amount of suffering they can cause by such extortion.

Precedents Are Cited

"The State has regulated the toll to be charged by the millers of the State, regulated the charges for public warehouses; for furnishing heat, light, water and gas, and in the present crisis, it should not hesitate to exercise the police power that I believe to be inherent in the State under the Constitution and the common law, to regulate not only the mining and sale of coal by the operators, but to extend that regulation through the jobbers down to the retailer who furnished it to the consumer.

"In the early part of the war, I caused a thorough study to be made of this whole question by competent attorneys in this city and elsewhere, and at that time reached the conclusion that the State has the power to regulate the coal industry. Upon the assumption that the Federal government might not then take control of the matter, I caused to be prepared a bill authorizing the creation of a commission to regulate the mining, transportation and sale of coal. The substance of this bill is embodied in the House bill which is before you for consideration, and I hope that the Senate will give to it its deliberate, care-

ful and most favorable consideration."

That the proposed coal control plan savors of the Socialistic, and is being eyed with keen disfavor apparently by the coal interests and the miners alike, is apparent from the many comments that arose in Indiana as soon as the measure came out from hiding and was passed by the House. That it, however, probably would prove of immense popularity to the public generally, and to many of the harassed utility managers, was just as apparent.

Several of the Senators, before whom the bill rested early in the week, branded it as Socialistic. They opposed it because they declared that they felt the State should not interfere much farther with private contracts. No one of them, however, opposed the measure because he believed something ought not to be done at once to remedy the coal price situation. How to do this without trending too closely toward Socialism, how to do it in a legal way, and how to guard against what apparently might be failure of any plan on the subject in the Indiana Senate, was keeping leaders busy early in the week.

The House of Representatives passed the bill by an overwhelming vote, only eight "noes" being recorded against it.

Some Senators as well as some House members were doubtful about the wisdom of the proposal to create a special commission to control the situation when some existing State organization, such as the board of accounts, might be empowered to do the work. It was certain that considerable attention would be given in the Senate to the legal status of the bill.

Harold A. Henderson, of Terre Haute, general counsel for the Indiana United Mine Workers of America, said:

"To my knowledge, no State has ever attempted to fix the price of coal. The general coal consumption of the United States is approximately 500,000,000 tons, and of Indiana approximately only 30,000,000 tons. The States of western Pennsylvania, Ohio, Illinois and Indiana comprise the central competitive coal field, producing approximately 200,000,000 tons. The question in mind is whether a price fixed in Indiana would naturally affect coal prices generally."

A number of leading senate Republicans, interviewed confidentially on the proposal that the State attempt to regulate coal prices, expressed serious doubt whether the State can get anywhere with such a plan. They said they realize that the proposal is immensely popular, and for that reason did not wish to be put in the attitude of opposing it, but some of them asserted that they could give the measure no sincere support because they believed that the principal result of such an attempt would be the spending of much public money, the providing of jobs for politicians and the failure of the plan in the end.

The measure, as it passed the House of Representatives in Indiana, is of vast interest to every gas company in the country, particularly since its passage would mark practically a new era of control of the basic industry of gas production. It follows:

A bill for an act, entitled "An act to regulate the price of coal mined and sold to the State of Indiana; to authorize the seizure of coal mines and facilities by the State and providing compensation for the owners, and to investigate the high cost of food products, profiteering, hoarding and destroying of food products by wholesalers, retail dealers or individuals engaged in the sale or distribution of food products and to create a commission defining its powers, prescribing its duties and providing penalties for the violation of this act."

Section 1. Be it enacted by the general assembly of the State of Indiana, That there is hereby created a coal commission, to be known as "Indiana Coal Commission," which shall consist of three members to be appointed one by the governor, one by the lieutenant governor and one by the speaker of the House of Representatives, and not more than two of whom shall be members of the same political party. One of the members so appointed shall, by the governor, be designated as the chairman of the commission. The members shall serve until the 31st day of March, 1921, and no longer, at which time said commission shall cease to exist, unless continued by subsequent legislation.

PROVISION FOR HEARINGS

Sec. 2. Immediately upon the taking effect of the act, the governor, lieutenant governor and speaker shall appoint the members of said commission, and it shall organize at once by selecting a secretary and such engineers, accountants, clerks, assistants and employees as in the judgment of said commission shall be necessary or proper in the performance of its duties. A majority of the commission shall constitute a quorum, but on the order of the commission any one member thereof may conduct any hearing or investigation, hear all evidence adduced at such hearing and report the same to the commission for its consideration and action. The salary of the said commissioners shall be $6,000 per annum, and of its secretary $3,000 per annum. The commission shall fix the salaries and compensation of its employees, clerks, engineers, accountants and assistants, and shall have power to employ and retain attorneys to appear for and represent it in any action brought by or against said commission and to fix the compensation to be paid said attorneys. Each member of the commission, before entering upon the discharge of his duties, shall give a bond in the penal sum of $15,000, conditioned upon the faithful performance by him of the duties of his office.

Sec. 3. Said commission shall prescribe rules and regulations for all hearings and investigations held before such commission and in order to carry out the terms and provisions of this act.

Sec. 4. Any person, copartnership or corporation against whom any final order is made by said commission, being dissatisfied therewith, or any such person, copartnership or corporation whose property is injuriously affected by any such final order of the commission, fixing a rate, prices to be paid for coal, or valuation of any coal mining property, may within ten days from the entry of such final order commence an action in the Marion Circuit Court of Marion County, Indiana, against said "Indiana Coal Commission" as defendant to vacate and set aside any such order on the ground that the same is confiscatory, indefinite, unreasonable or unlawful, in which action the defendant shall be served with summons returnable

five days after the service thereof. Said cause shall be tried expeditiously, and shall have precedence over all other business of such court. Nor shall the effect of such order be suspended nor the same vacated or set aside until the final determination of said cause by the court. If any such order shall be vacated, the commission shall have the full power to make a new order, after notice and hearing.

Removal by Governor

Sec. 5. The governor may remove any member of such commission, including the chairman, whenever he deems it for the public interest so to do, and upon notifying such persons in writing that he is removed because the governor deems it for the public interest, such person shall thereupon cease to be a member thereof, and the official having made the original appointment shall fill the vacancy by appointment. All other vacancies in the commission, caused by death, resignation or otherwise, shall be filled by appointment by the official having made the original appointment.

Sec. 6. Each of the commissioners and every agent and employee thereof shall have power to administer oaths, certify to any official act, issue subpenas, compel the attendance of witnesses and the production of books, accounts, papers, records, documents and testimony. And every person, firm or corporation owning, operating, controlling or leasing any coal mine or coal mining property in the State of Indiana, or engaged in the business of mining coal therein, or engaged in the business of selling coal at wholesale or retail in the State of Indiana, and all officers, agents, servants and attorneys of such persons is and are hereby required, upon proper subpena or order from the commission, to produce for the inspection of such commission all such books, records, accounts, papers, and documents and to give evidence of any fact bearing upon the price of coal, the cost of its production or sale and any agreement or understanding to regulate or control such price. In case of the disobedience on the part of any person or persons or failure to comply with any such order or subpena made or issued by any commissioner or by such commission, or upon the refusal of any witness to testify with respect to any matter about which he may be interrogated before the commission, or any commissioner or agent thereof, it shall be the duty of the circuit or superior court, or the judge thereof in vacation, in the county in which such person resides, upon the application of the commission or any commissioner, to issue a rule against such person so refusing to show cause why he should not be required to testify or to comply with such order, and such court, upon the return of such person to said order to show cause shall make such order as is proper and enforce the same as other orders of such court are now enforced pursuant to law.

License Plan Included

Sec. 8. Immediately upon the passage of this act every person, firm or corporation engaged in the business of mining coal within the State of Indiana and every person engaged in the sale of coal at wholesale or retail within such State shall apply to and obtain from said commission a license annually to do such business for the succeeding year for which the commission shall charge for each mining license the sum of $25, and for each wholesale dealers' license the sum of $10 and for each retail dealers' license the sum of $5, all of which sums shall be paid into the treasury of the State of Indiana, and used for the purpose of paying the salaries and expenses of such commission. No such license shall be issued to any person, firm or corporation which has violated any lawful order, rule or regulation of the commission or any member thereof, or which upon proper notice has failed to obey any order of the commission or of any commissioner for the production of any book, paper, record, data or document, or which has refused to give any evidence about which he may lawfully be interrogated on any matter which the commission or any member thereof was inquiring into. And any such license so issued may be revoked and annulled, after notice and upon a hearing before the full commission, for any cause which would justify the commission in refusing to issue such a license, subject, however, to the right of the person, firm or corporation whose license is so revoked or annulled to commence an action in the Marion Circuit Court to set aside such order revoking or annulling his or its license subject to the same provisions as are fixed by Section 4 hereof, for commencing an action to set aside or vacate other orders made by the commission. Any person who operates a coal mine or produces coal in this State or sells the same at wholesale or retail herein without having obtained such license, or after his or its license has been revoked, shall, upon conviction, be fined in any sum not exceeding $5,000, to which may be added imprisonment in the State Penal Farm for a period not exceeding one year or both fine and imprisonment.

As to Fixing Prices

Sec. 9. Said commission shall have the right and it shall be its duty, after full hearing, and after affording to all persons interested a full opportunity to be heard, to adduce evidence and to be represented by counsel, to regulate and fix the price at which all coal moving in intrastate commerce in the State of Indiana shall be sold, both to jobbers, wholesale and retail coal dealers and to the public, provided that no price so fixed shall be confiscatory, nor shall it be less than the actual cost of the coal plus a fair and reasonable return on the property used in the production and sale thereof. Said prices may be fixed either at so much a ton or on any other basis or scale which is fair, just and equitable, or the commission may prescribe maximum and minimum prices, if it sees fit to do so. If in its judgment the production of coal in any particular vicinity or of any particular kind of coal can be fairly regulated as to price by one order, the commission shall have power so to fix a price, after notifying all parties in interest of the hearing.

Sec. 10. It shall be the duty of the commission to determine, as soon as that can be done after its organization, the average monthly consumption of coal in Indiana for all purposes, and it shall have the power and it shall be the duty of the commission to require all persons, firms and corporations mining coal in Indiana to produce and

sell, or offer for sale, in this State a sufficient quantity of coal to supply domestic demands and at such a price to be fixed by the commission, the individual operators to furnish such proportions and amounts thereof as such commission shall, by appropriate order, prescribe.

Sec. 11. Nothing in this act shall be taken or construed as regulating the price of coal moving in interstate commerce, or as prohibiting the sale or transportation of coal in interstate commerce, but only as requiring the mining of a sufficient quantity of coal for domestic consumption except for manufacturing purposes, the general assembly recognizing that the coal deposits of this State are amply sufficient for decades to come to supply all legitimate demands of intra and interstate and foreign commerce, which will be made upon them. And any person, firm or corporation who shall refuse to comply with any such order, shall have his or its license to mine coal revoked after notice and hearing, with the right to test the validity of such order by commencing an action in the Marion Circuit Court, subject to the conditions prescribed in Sec. 4 of this act.

Sec. 12. No penalty shall be inflicted or fine or imprisonment imposed upon any person for violating any order of the commission except requiring the production of books, papers, documents and data or for refusal to testify, if he shall, within the time prescribed, file his complaint in the Marion Circuit Court to vacate such order, all as herein prescribed, and promptly prosecute the same, until after such cause shall have been finally disposed of in said circuit court and until so disposed of the said order of the commission shall not be deemed or held to be final so far as the criminal and penal provisions of this statute are concerned.

Counsel for the State

Sec. 13. The attorney general of Indiana shall represent the State in any action or proceeding brought by or against the commission and the governor or commission in its discretion may employ and pay special counsel. The State of Indiana shall have the right, through the attorney general or special counsel so selected, to be heard in a hearing fixing prices or any other hearing and in its own name may commence an action in the Marion Circuit Court and set aside or vacate any order made by such commission, making the commission and the interested parties defendants thereto, subject to all terms and conditions of Sec. 4 of this act.

Sec. 14. There is hereby imposed upon every ton of coal mined in this State after the taking effect of this act (including coal mined by the commissioners when a mine is seized by the commission), a license fee of 1 cent to be paid by each person, firm or corporation engaged in mining coal; such sum shall be paid into the treasury of the State of Indiana monthly on the tenth day of each calendar month. On or before the date of such payment, each person liable to pay such tax shall file on a form to be prescribed by the auditor of State a report showing the number of tons mined by him in the last preceding month. The money so paid shall be used in paying the expenses of said commission, including salaries, compensation and expenses of the commissioners, agents, clerks, employees, special counsel and assistants, but if not sufficient for that purpose, there is hereby appropriated out of the treasury and out of the funds not otherwise appropriated a sum sufficient to pay all said expenses.

Sec. 15. If any one or more sections of this act or any part of provision of any section is declared to be invalid or unconstitutional by any court, such decision shall not affect the validity of the remainder of this act, it being hereby declared to be the legslative intent to enact all valid parts of this law and that the same shall be and remain in force notwithstanding the fact that some part or portion thereof should be declared to be invalid.

Sec. 16. In fixing the cost of coal to the producer the commission or any court passing upon the question shall allow the cost of production, including all reasonable and proper expenses for operation, maintenance, depreciation and depletion and shall add thereto a just and reasonable profit. In fixing the prices for dealers the commission or court, as the case may be, shall allow the cost to the dealer, including transportation and reasonable distribution charges and add thereto a just and reasonable sum for his profit in the transaction.

As to Federal Regulations

Sec. 17. In the event that the Federal government through any of its agencies shall take over the operation of any coal mine situated within the State of Indiana or of the production thereof or the means or facilities for producing such coal, then and in that event during the time such coal mine is taken over or its production requisitioned by the Federal government, this act and none of its terms and conditions shall be construed as authorizing the State of Indiana or said commission to control or appropriate said mining property, its appurtenances or appliances, but the same shall be during such time subject only to the Federal control. If the Federal government through any of its agencies shall take over any distributing instrumentality or shall make any order, rule or regulation, or enforce any practice affecting in any way any coal producer or distributor in this State, then for the time that such instrumentality is taken over, or such order, rule, regulation or practice is in force, this act shall not apply and the production, sale or distribution of such coal shall, to the extent the same is affected thereby, be under the sole control of the Federal government.

Sec. 18. Whoever with knowledge that the prices of coal have been fixed, as herein provided, shall ask, demand or receive a higher price therefor or with knowledge thereof shall refuse to conform to any valid order made by the commissioner shall be guilty of a misdemeanor and shall upon conviction be punished by a fine of not more than $5,000 or imprisonment in the State Penal Farm for not more than six months or by both. Each independent transaction shall constitute a separate offense.

Depositing of Money

Sec. 19. In the event the State acting through said commission shall take over and operate any coal mine or any coal producing property, the funds arising from the sale of the coal so produced shall be deposited in a special account with the treasurer of the

(*Continued on page* 100.)

Beacon Oil Refinery Starts Operations

Last week operations commenced at the new refinery of the Beacon Oil Company at Everett, Mass., only 11 months having elapsed since the date of breaking ground. In the conception and execution of this building project Boston brains and capital have made another important contribution to the industrial welfare of New England.

As much as four years ago officials of the Massachusetts Gas Companies were considering entrance into the oil refining business. Plans were necessarily held in abeyance during the war. After the armistice, Clifford M. Leonard of Chicago, one of the country's most prominent constructors of oil refineries, who was planning along the same lines as the Massachusetts gas interests, chose Everett, Mass., as the most desirable site on the Atlantic coast for a new refinery. The natural consequence was a joining of forces, and the organization of the Beacon Oil Company with $2,500,000 capital followed promptly. Mr. Leonard's firm, the Leonard Construction Company, put up the refinery, which has cost about $4,000,000 to date.

The Massachusetts Gas Companies owns about 42 per cent of Beacon stock, which has recently been increased to $3,500,000. James L. Richards, president of the Massachusetts Gas Companies, is chairman of the board of directors of the Beacon Oil Company; Capt. W. E. McKay, long identified with enterprises owned by the Massachusetts Gas Companies, is president; H. L. Wollenberg, formerly general manager of the Aetna Explosives Company, is vice-president and general manager, and Edwin M. Richards, treasurer of the Massachusetts Gas Companies, is also treasurer of the oil company. The directors, in addition to J. L. Richards, McKay and Wollenberg, are Robert Grant, president of the New England Fuel & Transportation Company; Robert Winsor, of Kidder, Peabody & Co.; Galen L. Stone, of Hayden, Stone & Co.; Louis K. Liggett, president of the United Drug Company; C. M. Leonard, Leonard Construction Company; H. W. Endicott, Endicott-Johnson Company, and F. E. Snow, of Gaston, Snow, Saltonstall & Hunt.

The following facts and figures describe the new refinery, which is claimed to be as modern in construction as exists anywhere in the western hemisphere:

Property.—Substantially 100 acres in Everett, adjacent to New England Fuel & Transportation Company and Boston Consolidated Gas Company, with direct connections to Boston & Maine and Boston & Albany railroads and having 1,500 linear feet of deep water frontage on the Mystic and Island End rivers.

Docks and Berths.—Sufficient berthing room for two large steamers and one barge to be handled simultaneously, and even a larger number by having more than one ship abreast. Further development of company's waterfront could easily provide for four additional deep water berths for large vessels.

Pipe Lines to Storage Tanks.—Connecting the wharf with the storage tanks, located about 3,500 ft. away, is one line of 16-in. pipe carrying salt water for condensing purposes, one line of 12-in. pipe for crude oil, two lines of 10-in. pipe for fuel oil, one of 8-in. for gas oil, one of 8-in. for gasoline and one of 6-in. for kerosene. Provision has thus been made for receiving crude oil and for making marine shipments of fuel oil, gasoline, kerosene, gas oil and fuel oil. The company can bunker ships right at the dock, or, with its own marine equipment, can supply them out in the harbor.

Underground Concrete Storage.—There are 11 underground concrete storage tanks with a total capacity of 750,000 barrels. These tanks may be used at will either for crude oil or fuel oil, but it is the present intention to devote about 600,000 barrels capacity to crude oil (a 60-day supply at 10,000 barrels per day) and about 150,000 barrels capacity for fuel oil.

Distillation Capacity.—The distilling plant consists of two pipe stills with a capacity for topping 10,000 barrels of light Mexican crude per day (i. e., removing gasoline and some kerosene, and leaving the residuum, which is the usual commercial Mexican fuel oil). In addition to the pipe stills there are 15 cylindrical stills having a total charging capacity of 12,000 barrels.

With this plant it is possible to run 15,000 barrels a day and to produce gasoline, kerosene, gas oil, fuel oil and asphalt. If the entire plant were operated merely as a topping plant, and produced only gasoline, kerosene and fuel oil, it would have a capacity of 30,000 barrels per day.

In connection with the distilling plant there are 45 steel tanks of various sizes and capacity. The plant also contains four large agitators for treating and filtering gasoline and kerosene and the necessary equipment. There is also an acid sludge treating plant. All operations in the refinery require the transfer of liquids, which is accomplished by pumping. The plant has all told about 60 pumps.

Steel Storage Tanks.—The so-called tank farm contains 18 steel storage tanks, having an aggregate capacity of about 200,000 barrels, which will be used for storing finished light products, such as gasoline, kerosene and gas oil. Adjacent to the tank farm is a double track steel bridge loading racks with which 18 tank cars could be completely loaded in one hour.

Power.—The boiler house is of the most modern type of construction, containing six 500 horsepower boilers, all equipped for burning residuum which will be produced in the refinery. The boiler house also accommodates two power units for furnishing the electricity required at the plant.

Fire Protection.—Consists of a high pressure system with three independent sources for water, and a very complete Foamite system; also safety steam lines, portable engines, hose carts, etc. The plant is insured at a rate said to be the lowest ever written on an oil refinery.

The first tanker with crude oil has already arrived at the Beacon Oil refinery. The company is scheduled to receive 350,000 barrels of crude oil in July and 500,000 barrels per month beginning with August. Crude oil requirements are covered for a considerable period of years under contract, and tank steamers are available and assigned to this delivery service. For distributing its products, the Beacon Company has its own tank cars and marine equipment. It is not yet equipped to handle retail business.

Judging by the current high level of prices for petroleum products and the encouraging outlook for the future, the Beacon Oil refinery should, practically from the beginning, be able to earn a handsome return on its investment, in which Massachusetts Gas Companies will participate to the extent of almost one-half.

Bill Creating Special State Commifsion to Supervise Coal Industry Before Indiana Legislature

(*Continued from page* 98.)

State of Indiana and be used as a fund for the purpose of operating said mine or mining property or any other mining property taken over by the State, or for the purpose of paying to the owner thereof any compensation which may be awarded to him under the provisions of this act, and warrants for such purposes shall be drawn against such fund by the auditor of State upon the certificate of such commission.

Sec. 20. This act shall receive such a construction as will avoid any conflict with any Federal statute, or with any rule, regulation, practice or order lawfully adopted by any governmental agency or officer charged with the duty of controlling or directing the sale or distribution of coal.

Sec. 21. The commission shall have the right to hold joint hearings with any other State or Federal body, agency, officer, board or commission on any question or matter included within the provisions of this act, if such hearing can be arranged and is thought by the commission to be advantageous. And for the purpose of such hearings, the commissioners appointed may travel at the expense of the State to and from the place fixed therefor. And, if deemed advisable or advantageous, said Indiana coal commission shall have the power to make, with any such other State or Federal body, agency, officer, board or commission, any joint order, joint rule, joint regulation, joint rate, or establish any joint practice or to make the same order, rule, regulation, rate or practice by separate order. And such Indiana coal commission may, at any hearing held by it, avail itself of any information, data, records or accounts collected or compiled by any other State or Federal agency.

PRIORITY PLAN INCLUDED

Sec. 22. Said commission shall have the right and power to fix, among various classes of users of coal in this State, the priority in which such classes shall be furnished coal, including railroads, public utilities, industries and the people of this State, and, in case of a shortage of coal or transportation facilities, to determine such class or classes of users shall be first supplied and to what extent. In case of emergency, said commission may order and direct that coal be furnished to such users so designated by it from any mine or mining territory in the State, and fix the quantity so to be delivered. When said commission has made such determination, it shall certify same to the Public Service commission, which shall immediately take such steps with reference thereto and in order to accomplish the transportation thereof, as are now or may be hereafter authorized by law.

Sec. 23. In no event shall any price for coal be fixed in excess of the price established therefor by the Federal government, or any of its agencies.

Sec. 23½. In the event the State acting through said commission shall take over and operate any coal mine or any coal-producing property the employee of said mine or coal-producing property shall have the same working conditions and the same wages as the employees of coal mines working in the same locality. It is further provided that no convict labor shall be employed in said mine or mines or coal-producing property so taken over by said commission.

Sec. 23¾. Said commission shall also investigate the high cost of food products and profiteering, hoarding and destroying of food products by wholesalers, retailers, dealers and individuals engaged in the sale and distribution of food products and make recommendations for the preparation of a bill to be presented to the next general assembly recommending such laws as will prevent said profiteering, hoarding and destroying of food and food products used for human consumption on the part of said wholesalers, retailers, individuals or distributors of such food and food products.

Sec. 24. There being an emergency for the immediate taking effect, the same shall be in full force and effect from and after its passage.

Plenty of Gas for Topeka

Topeka will not be short of gas next winter, according to T. S. Salathiel, attorney for the receivers of the Kansas Natural Gas Company, who says that with the new well which has been opened up in Chase County, between 3,000,000 and 5,000,000 cu. ft. of gas a day will be added to the supply for this section.

The Chase County well is on the Kansas natural lease and is one of the deepest gas wells put down in that section. The receivers contracted for two wells, the first of which was dry, but at 1,400 feet a strong flow of gas was struck in the second well, and a company engineer has been sent out to test the flow.

Leakage losses will be reduced for the coming year. The work of going over the lines has been in progress for some time.

Texas Pacific Coal & Oil Drilling New Wells

Prairie Oil & Gas Company, drilling joint account with the Texas Pacific Coal & Oil Company, has completed No. 1 well on the Ridell lease, Stephens County, Texas, flowing 200 barrels. Well was completed at 1,940 ft. and considerable importance is attached to the find at that depth which is comparatively shallow. The same companies have completed Langford No. 1, Stephens County, at 1,670 ft. with a gas flow estimated at 50,000,000 cu. ft.

Los Angeles G. & E. to Spend $2,500,000 in Extensions

Two million, five hundred thousand dollars will be spent by the Los Angeles Gas & Electric Company, Los Angeles, Cal., this summer in the construction of 60 miles of gas mains and in other improvements. William Bauhyte, vice-president of the company, said: "The rapid growth of the city necessitates work this summer on a larger scale than ever before."

W. S. QUIGLEY, president Quigley Furnace Specialties Company, New York City, sailed for France on the Cunard liner *Imperator*, on July 15. His trip is for the purpose of furthering the business of the Quigley organization in England, France, Belgium, Italy and Spain.